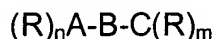


## **AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Original) A process for tetramerisation of olefins wherein an olefinic feedstream is contacted with a catalyst system which includes the combination of

- a transition metal compound; and
- a heteroatomic ligand described by the following general formula



wherein

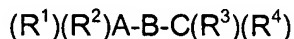
A and C are independently selected from the group consisting of phosphorus, arsenic, antimony, oxygen, bismuth, sulphur, selenium and nitrogen;

B is a linking group between A and C;

the R groups are the same or different, and each R is independently selected from the group consisting of a hydrocarbyl group, a hetero hydrocarbyl group, a substituted hydrocarbyl group, and a substituted hetero hydrocarbyl group;

n and m for each R is independently determined by the respective valence and oxidation state of A and C; and

provided that where the heteroatomic ligand is described by the following general formula



wherein

A and C are independently selected from the group consisting of phosphorus, arsenic, antimony, bismuth and nitrogen;

B is a linking group between A and C; and

each of  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  is independently selected from the group consisting of a hydrocarbyl group, a hetero hydrocarbyl group, a substituted hydrocarbyl group, and a substituted hetero hydrocarbyl group;

any substituents that may be on one or more of  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  are non electron donating; and where  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  are independently aromatic, including hetero aromatic, groups, not all the groups  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  have a substituent on the atom adjacent to the atom bound to A or C.

2. (Original) The process as claimed in claim 1, wherein the olefinic feedstream includes an  $\alpha$ -olefin and the product stream includes at least 30% of a tetramerised  $\alpha$ -olefin monomer.
3. (Currently amended) The process as claimed in ~~either one of claims~~ claim 1 ~~[[or 2]]~~, wherein the olefinic feedstream includes ethylene and the product stream includes at least 30% 1-octene.
4. (Currently amended) The process as claimed in ~~any one of claims~~ claim 1 ~~[[to 3]]~~, wherein the olefinic feedstream includes ethylene and wherein  $(C_6 + C_8) : (C_4 + C_{10})$  ratio in the product stream is more than 2.5:1.
5. (Currently amended) The process as claimed in ~~either one of claims~~ claim 3 ~~[[or 4]]~~, wherein ethylene is contacted with the catalyst system at a pressure of more than 1000 kPa (10 barg).
6. (Currently amended) The process as claimed in ~~any one of claims~~ claim 1 ~~[[to 5]]~~, wherein the heteroatomic ligand is described by the following general formula  $(R^1)(R^2)A-B-C(R^3)(R^4)$  wherein A and C are independently selected from the group consisting of phosphorus, arsenic, antimony, bismuth and nitrogen; B is a linking group between A and C;

and each of  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  is independently selected from the group consisting of a hydrocarbyl group, a hetero hydrocarbyl group, a substituted hydrocarbyl group, and a substituted hetero hydrocarbyl group.

7. (Original) The process as claimed in claim 6, wherein the heteroatomic ligand is described by the following general formula  $(R^1)(R^2)A-B-C(R^3)(R^4)$  wherein A and C are independently selected from the group comprising of phosphorous, arsenic, antimony, bismuth and nitrogen; B is a linking group between A and C; and each of  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  is independently selected from the group consisting of a non-aromatic hydrocarbyl group, a non-aromatic heterohydrocarbyl group, an aromatic hydrocarbyl group, an aromatic hetero hydrocarbyl group and a hetero aromatic hetero hydrocarbyl group.

8. (Currently amended) The process as claimed in ~~either one of claims~~ claim 6 ~~[[or 7]]~~, wherein each of  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  is independently an aromatic group, including a hetero aromatic group and not all the groups  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  have a substituent on the atom adjacent to the atom bound to A or C.

9. (Currently amended) The process as claimed in ~~any one of claims~~ claim 1 ~~[[to 8]]~~, wherein each non electron donating substituent is non polar.

10. (Currently amended) The process as claimed in ~~any one of claims~~ claim 1 ~~[[to 9]]~~, wherein B is selected from the group consisting of: an organic linking group comprising a hydrocarbyl, substituted hydrocarbyl, heterohydrocarbyl and a substituted heterohydrocarbyl; an inorganic linking group comprising a single atom linking spacer and a group comprising methylene, dimethylmethylene, 1,2-ethane, 1,2-phenylene, 1,2-propane, 1,2-catechol, 1,2-dimethylhydrazine,  $-B(R^5)-$ ,  $-Si(R^5)_2-$ ,  $-P(R^5)-$  and  $-N(R^5)-$  where  $R^5$  is hydrogen, a hydrocarbyl or substituted hydrocarbyl, a substituted heteroatom or a halogen.

11. (Original) The process as claimed in claim 10, wherein B is a single atom linking spacer.

12. (Original) The process as claimed in claim 10, wherein B is  $-N(R^5)-$ , wherein  $R^5$  is selected from the group consisting of hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, aryloxy, substituted aryloxy, halogen, nitro, alkoxycarbonyl, carbonyloxy, alkoxy, aminocarbonyl, carbonylamino, dialkylamino, a silyl group or a derivative thereof, and an aryl group substituted with any of these substituents.

13. (Currently amended) The process as claimed in ~~any one of claims~~ claim 1 ~~[[to 12]]~~, wherein A and/or C is independently oxidised by S, Se, N or O, where the valence of A and/or C allows for such oxidation.

14. (Currently amended) The process as claimed in ~~any one of claims~~ claim 1 ~~[[to 12]]~~, wherein each of A and C is phosphorus.

15. (Original) The process as claimed in claim 12, wherein each of  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  is independently selected from the group consisting of benzyl, phenyl, tolyl, xylyl, mesityl, biphenyl, naphthyl, anthracenyl, dimethylamino, diethylamino, methylethylamino, thiophenyl, pyridyl, thioethyl, thiophenoxy, trimethylsilyl, dimethylhydrazyl, methyl, ethyl, ethenyl, propyl, butyl, propenyl, propynyl, cyclopentyl, cyclohexyl, ferrocenyl and tetrahydrofuran group.

16. (Original) The process as claimed in claim 15, wherein each of  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  is independently selected from the group consisting of a phenyl, tolyl, biphenyl, naphthyl, thiophenyl and ethyl group.

17. (Original) The process as claimed in claim 1 wherein the ligand is selected from the group consisting of

(phenyl)<sub>2</sub>PN(methyl)P(phenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PN(pentyl)P(phenyl)<sub>2</sub>,  
(phenyl)<sub>2</sub>PN(phenyl)P(phenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PN(*p*-methoxyphenyl)P(phenyl)<sub>2</sub>,  
(phenyl)<sub>2</sub>-PN(*p*-<sup>t</sup>butylphenyl)P(phenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PN((CH<sub>2</sub>)<sub>3</sub>-N-morpholine)P(phenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PN(Si(CH<sub>3</sub>)<sub>3</sub>)P(phenyl)<sub>2</sub>,  
(((phenyl)<sub>2</sub>P)<sub>2</sub>NCH<sub>2</sub>CH<sub>2</sub>)N, (ethyl)<sub>2</sub>PN(methyl)P(ethyl)<sub>2</sub>,

$(\text{ethyl})_2\text{PN}(\text{isopropyl})\text{P}(\text{phenyl})_2$ ,  $(\text{ethyl})(\text{phenyl})\text{PN}(\text{methyl})\text{P}(\text{ethyl})(\text{phenyl})$ ,  
 $(\text{ethyl})(\text{phenyl})\text{PN}(\text{isopropyl})\text{P}(\text{phenyl})_2$ ,  
 $(\text{phenyl})_2\text{P}(=\text{Se})\text{N}(\text{isopropyl})\text{P}(\text{phenyl})_2$ ,  $(\text{phenyl})_2\text{PCH}_2\text{CH}_2\text{P}(\text{phenyl})_2$ , (o-ethylphenyl)(phenyl)PN(isopropyl)P(phenyl)<sub>2</sub>, (o-methylphenyl)<sub>2</sub>PN(isopropyl)P(o-methylphenyl)(phenyl),  
 $(\text{phenyl})_2\text{PN}(\text{benzyl})\text{P}(\text{phenyl})_2$ ,  $(\text{phenyl})_2\text{PN}(1\text{-cyclohexyl-ethyl})\text{P}(\text{phenyl})_2$ ,  
 $(\text{phenyl})_2\text{PN}[\text{CH}_2\text{CH}_2\text{CH}_2\text{Si}(\text{OMe}_3)]\text{P}(\text{phenyl})_2$ ,  
 $(\text{phenyl})_2\text{PN}(\text{cyclohexyl})\text{P}(\text{phenyl})_2$ ,  $(\text{phenyl})_2\text{PN}(2\text{-methylcyclohexyl})\text{P}(\text{phenyl})_2$ ,  
 $(\text{phenyl})_2\text{PN}(\text{allyl})\text{P}(\text{phenyl})_2$ ,  $(2\text{-naphthyl})_2\text{PN}(\text{methyl})\text{P}(2\text{-naphthyl})_2$ , (p-biphenyl)<sub>2</sub>-PN(methyl)P(p-biphenyl)<sub>2</sub>,  
 $(p\text{-methylphenyl})_2\text{PN}(\text{methyl})\text{P}(p\text{-methylphenyl})_2$ ,  $(2\text{-thiophenyl})_2\text{PN}(\text{methyl})\text{P}(2\text{-thiophenyl})_2$ ,  
 $(\text{phenyl})_2\text{PN}(\text{methyl})\text{N}(\text{methyl})\text{P}(\text{phenyl})_2$ ,  $(m\text{-methylphenyl})_2\text{PN}(\text{methyl})\text{P}(m\text{-methylphenyl})_2$ ,  $(\text{phenyl})_2\text{PN}(\text{isopropyl})\text{P}(\text{phenyl})_2$ , and  
 $(\text{phenyl})_2\text{P}(=\text{S})\text{N}(\text{isopropyl})\text{P}(\text{phenyl})_2$ .

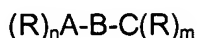
18. (Currently amended) The process as claimed in ~~of any one of claims~~ claim 1 [[to 17]] wherein the catalyst system is prepared by combining in any order the heteroatomic ligand, the transition metal compound and an activator.

19. (Currently amended) The process as claimed in ~~of any one of claims~~ claim 1 [[to 17]] wherein the catalyst system is a pre-formed coordination complex prepared by combining the heteroatomic ligand and the transition metal compound and wherein the pre-formed coordination complex is added to the olefinic feedstream and an activator.

20. (Currently amended) The process as claimed in ~~any one of claims~~ claim 1 [[to 19]] , wherein the transition metal in the transition metal compound is selected from the group consisting of chromium, molybdenum, tungsten, titanium, tantalum, vanadium and zirconium.

21. (Original) The process as claimed in claim 20, wherein the transition metal is chromium.
22. (Currently Amended) The process as claimed in ~~any one of claims~~ claim 1 ~~[[to 21]]~~ , wherein the transition metal compound is selected from the group consisting of an inorganic salt, an organic salt, a co-ordination complex and organometallic complex.
23. (Original) The process as claimed in claim 22, wherein the transition metal compound is selected from the group consisting of chromium trichloride tris-tetrahydrofuran complex, (benzene)tricarbonyl chromium, chromium (III) octanoate, chromium (III) acetylacetonate, chromium hexacarbonyl and chromium (III) 2-ethylhexanoate.
24. (Original) The process as claimed in claim 23, wherein the transition metal is a complex selected from chromium (III) acetylacetonate and chromium (III) 2-ethylhexanoate.
25. (Currently amended) The process as claimed in ~~any one of claims~~ claim 1 ~~[[to 24]]~~, wherein the transition metal from the transition metal compound and the heteroatomic ligand are combined to provide a transition metal/ligand ratio from about 0.01:100 to 10 000:1.
26. (Currently amended) The process as claimed in ~~any one of claims~~ claim 1 ~~[[to 25]]~~, wherein the catalyst systems includes an activator selected from the group consisting of an organoaluminium compound, an organoboron compound, an organic salt, such as methyllithium and methylmagnesium bromide, an inorganic acid and salt, such as tetrafluoroboric acid etherate, silver tetrafluoroborate and sodium hexafluoroantimonate.
27. (Original) The process as claimed in claims 26, wherein the activator is an alkylaluminoxane.
28. (Original) The process as claimed in claim 27, wherein the transition metal and the aluminoxane are combined in proportions to provide an Al/transition metal ratio from about 1:1 to 10 000:1.
29. (Original) A catalyst system which includes the combination of
- a transition metal compound; and

- a heteroatomic ligand described by the following general formula



wherein

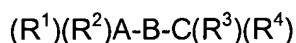
A and C are independently selected from the group consisting of phosphorus, arsenic, antimony, oxygen, bismuth, sulphur, selenium and nitrogen;

B is a linking group between A and C;

the R groups are the same or different, and each R is independently selected from the group consisting of a hydrocarbyl group, a hetero hydrocarbyl group, a substituted hydrocarbyl group, and a substituted hetero hydrocarbyl group;

n and m for each R is independently determined by the respective valence and oxidation state of A and C; and

provided that where the heteroatomic ligand is described by the following general formula



wherein

A and C are independently selected from the group consisting of phosphorus, arsenic, antimony, bismuth and nitrogen;

B is a linking group between A and C; and

each of  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  is independently selected from the group consisting of a hydrocarbyl group, a hetero hydrocarbyl group, a substituted hydrocarbyl group, and a substituted hetero hydrocarbyl group;

any substituents that may be on one or more of  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  are non electron donating;

and where  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  are independently aromatic, including hetero aromatic, groups, not

all the groups  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  have a substituent on the atom adjacent to the atom bound to A or C.

30. (Original) The catalyst system of claim 29 which is a tetramerisation catalyst system.

31. (Currently amended) The catalyst system of ~~either one of claims~~ claim 29 ~~[[or 30]]~~ wherein the heteroatomic ligand is described by the following general formula  $(R^1)(R^2)A-B-C(R^3)(R^4)$  wherein A and C are independently selected from the group consisting of phosphorus, arsenic, antimony, bismuth and nitrogen; B is a linking group between A and C; and each of  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  is independently selected from the group consisting of a hydrocarbyl group, a hetero hydrocarbyl group, a substituted hydrocarbyl group, and a substituted hetero hydrocarbyl group.

32. (Currently amended) The catalyst system of ~~any one of claims~~ claim 29 ~~[[to 31]]~~ wherein B is selected from the group consisting of an organic linking group comprising a hydrocarbyl, substituted hydrocarbyl, heterohydrocarbyl and a substituted heterohydrocarbyl; an inorganic linking group comprising a single atom linking spacer; and a group comprising methylene, dimethylmethylene, 1,2-ethane, 1,2-phenylene, 1,2-propane, 1,2-catechol, 1,2-dimethylhydrazine,  $-B(R^5)-$ ,  $-Si(R^5)_2-$ ,  $-P(R^5)-$  and  $-N(R^5)-$  where  $R^5$  is hydrogen, a hydrocarbyl or substituted hydrocarbyl, a substituted heteroatom or a halogen.

33. (Original) The catalyst system of claim 32 wherein B is  $-N(R^5)-$ , wherein  $R^5$  is selected from the group consisting of hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, aryloxy, substituted aryloxy, halogen, nitro, alkoxycarbonyl, carbonyloxy, alkoxy, aminocarbonyl, carbonylamino, dialkylamino, a silyl group or a derivative thereof, and an aryl group substituted with any of these substituents.

34. (Currently amended) The catalyst system of ~~any one of claims~~ claim 29 ~~[[to 33]]~~ wherein each of A and C is independently phosphorus .



35. (Currently amended) The catalyst system of ~~any one of claims~~ claim 29 ~~[[to 34]]~~ wherein each of R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> is independently selected from the group consisting of benzyl, phenyl, tolyl, xylyl, mesityl, biphenyl, naphthyl, anthracenyl, dimethylamino, diethylamino, methylethylamino, thiophenyl, pyridyl, thioethyl, thiophenoxy, trimethylsilyl, dimethylhydrazyl, methyl, ethyl, ethenyl, propyl, butyl, propenyl, propynyl, cyclopentyl, cyclohexyl, ferrocenyl and tetrahydrofuranyl group.
36. (Original) The catalyst system of claim 35 wherein each of R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are independently selected from the group consisting of a phenyl, tolyl, biphenyl, naphthyl, thiophenyl and ethyl group.
37. The catalyst system of claim 29 wherein the ligand is selected from the group consisting of
- (phenyl)<sub>2</sub>PN(methyl)P(phenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PN(pentyl)P(phenyl)<sub>2</sub>,  
 (phenyl)<sub>2</sub>PN(phenyl)P(phenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PN(*p*-methoxyphenyl)P(phenyl)<sub>2</sub>,  
 (phenyl)<sub>2</sub>-PN(*p*-<sup>t</sup>butylphenyl)P(phenyl)<sub>2</sub><sup>2</sup>, (phenyl)<sub>2</sub>PN((CH<sub>2</sub>)<sub>3</sub>-N-morpholine)P(phenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PN(Si(CH<sub>3</sub>)<sub>3</sub>)P(phenyl)<sub>2</sub>,  
 (((phenyl)<sub>2</sub>P)<sub>2</sub>NCH<sub>2</sub>CH<sub>2</sub>)N, (ethyl)<sub>2</sub>PN(methyl)P(ethyl)<sub>2</sub>,  
 (ethyl)<sub>2</sub>PN(isopropyl)P(phenyl)<sub>2</sub>, (ethyl)(phenyl)PN(methyl)P(ethyl)(phenyl),  
 (ethyl)(phenyl)PN(isopropyl)P(phenyl)<sub>2</sub>,  
 (phenyl)<sub>2</sub>P(=Se)N(isopropyl)P(phenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PCH<sub>2</sub>CH<sub>2</sub>P(phenyl)<sub>2</sub>, (o-ethylphenyl)(phenyl)PN(isopropyl)P(phenyl)<sub>2</sub>, (o-methylphenyl)<sub>2</sub>PN(isopropyl)P(o-methylphenyl)(phenyl),  
 (phenyl)<sub>2</sub>PN(benzyl)P(phenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PN(1-cyclohexyl-ethyl)P(phenyl)<sub>2</sub>,  
 (phenyl)<sub>2</sub>PN[CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>Si(OMe<sub>3</sub>)]P(phenyl)<sub>2</sub>,

(phenyl)<sub>2</sub>PN(cyclohexyl)P(phenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PN(2-methylcyclohexyl)P(phenyl)<sub>2</sub>,  
 (phenyl)<sub>2</sub>PN(allyl)P(phenyl)<sub>2</sub>, (2-naphthyl)<sub>2</sub>PN(methyl)P(2-naphthyl)<sub>2</sub>, (p-biphenyl)<sub>2</sub>-  
 PN(methyl)P(p-biphenyl)<sub>2</sub>,  
 (p-methylphenyl)<sub>2</sub>PN(methyl)P(p-methylphenyl)<sub>2</sub>, (2-thiophenyl)<sub>2</sub>PN(methyl)P(2-thiophenyl)<sub>2</sub>,  
 (phenyl)<sub>2</sub>PN(methyl)N(methyl)P(phenyl)<sub>2</sub>, (m-methylphenyl)<sub>2</sub>PN(methyl)P(m-  
 methylphenyl)<sub>2</sub>, (phenyl)<sub>2</sub>PN(isopropyl)P(phenyl)<sub>2</sub>, and  
 (phenyl)<sub>2</sub>P(=S)N(isopropyl)P(phenyl)<sub>2</sub>.

38. (Currently amended) The catalyst system of ~~any one of claims~~ claim 29 ~~[[to 37]]~~  
 wherein the transition metal in the transition metal compound is selected from any one of the  
 group consisting of chromium, molybdenum, tungsten, titanium, tantalum, vanadium and  
 zirconium.

39. (Original) The catalyst system of claim 38, wherein the transition metal is chromium.

40. (Currently amended) The catalyst system of ~~any one of claims~~ claim 29 ~~[[to 40]]~~  
 wherein the transition metal compound is selected from the group consisting of an inorganic  
 salt, organic salt, a co-ordination complex and organometallic complex.

41. (Original) The catalyst system of claim 40 wherein wherein the transition metal  
 compound is selected from the group consisting of chromium trichloride tris-tetrahydrofuran  
 complex, (benzene)tricarbonyl chromium, chromium (III) octanoate, chromium (III)  
 acetylacetonate, chromium hexacarbonyl and chromium (III) 2-ethylhexanoate.

42. (Currently amended) The catalyst system of ~~any one of claims~~ claim 29 ~~[[to 41]]~~  
 wherein the transition metal from the transition metal compound and the heteroatomic ligand are  
 combined to provide a transition metal/ligand ratio from about 0.01:100 to 10 000:1.

43. (Currently amended) The catalyst system of ~~any one of claims~~ claim 29 ~~[[to 42]]~~ which  
 includes an activator.

44. (Original) The catalyst system of claim 43 wherein the activator is an alkylaluminumoxane.

45. (Original) The catalyst system of claim 44 wherein the transition metal and the aluminumoxane are combined in proportions to provide an Al/transition metal ratio from about 1:1 to 10 000:1.

46-47 (Cancelled).